

WHAT IS CLAIMED IS:


- 1 1. An integrated circuit system, comprising:
2 a die incorporating an integrated circuit and having a top side and a
3 bottom side, the top side supporting an electrical signal communication
4 metallization and a top side thermal dissipation metallization, and the bottom side
5 supporting a bottom side thermal dissipation metallization.
- 1 2. The system of claim 1, wherein the electrical signal communication
2 metallization comprises a plurality of bonding elements.
- 1 3. The system of claim 2, wherein the bonding elements are in a
2 peripheral region of the top side of the die.
- 1 4. The system of claim 3, wherein the top side thermal dissipation
2 metallization is disposed in a central region of the top side of the die.
- 1 5. The system of claim 4, wherein the central region is surrounded by
2 the peripheral region.
- 1 6. The system of claim 1, wherein the electrical signal communication
2 metallization is disposed in a peripheral region of the top side of the die
3 surrounding a central region of the top side of the die containing the top side
4 thermal dissipation metallization.
- 1 7. The system of claim 1, wherein the top side thermal dissipation
2 metallization comprises a patterned metal layer.
- 1 8. The system of claim 7, wherein the patterned metal layer comprises
2 at least one through-hole.
- 1 9. The system of claim 8, wherein the patterned metal layer comprises
2 an array of through-holes.
- 1 10. The system of claim 1, further comprising a package comprising a
2 top heat spreader metallurgically bonded to the top side thermal dissipation
3 metallization of the die.

1 11. The system of claim 10, wherein the integrated circuit is connected
2 electrically to the top side heat spreader by an electrical path extending through
3 the top side thermal dissipation metallization.

1 12. The system of claim 10, wherein the package further comprises an
2 electrical interface and a substrate containing a wiring interconnection between
3 the electrical signal communication metallization and the electrical interface.

1 13. The system of claim 12, wherein the top heat spreader is mounted
2 on the substrate and forms a lid of the package covering the top side of the die.

1 14. The system of claim 10, wherein the package further comprises a
2 bottom heat spreader metallurgically bonded to the bottom side thermal
3 dissipation metallization of the die.

1 15. A method of making an integrated circuit system, comprising: 
2 forming on a top side of a substrate multiple die regions each having an
3 electrical signal communication metallization and a top side thermal dissipation
4 metallization;
5 forming on a bottom side of the substrate a bottom side thermal dissipation
6 metallization for each die region; and
7 singulating the die regions to form respective integrated circuit dice.

1 16. The method of claim 15, wherein, in each die region, the electrical
2 signal communication metallization comprises a plurality of bonding elements
3 disposed in a peripheral die region and the top side thermal dissipation
4 metallization is disposed in a central die region surrounded by the peripheral die
5 region.

1 17. The method of claim 15, wherein each top side thermal dissipation
2 metallization comprises a metal layer with an array of through-holes.

1 18. The method of claim 15, further comprising mounting each
2 singulated die in a respective package having a top heat spreader, wherein
3 mounting a singulated die comprises metallurgically bonding the top heat

4 spreader of a package to the top side thermal dissipation metallization of the
5 singulated die.

1 19. The method of claim 18, wherein the package additionally includes
2 a substrate and mounting the singulated die further comprises mounting the
3 package substrate to the bottom side thermal dissipation metallization of the
4 singulated die.

1 20. The method of claim 18, wherein the top heat spreader is mounted
2 on the substrate and forms a lid of the package, and further comprising
3 encapsulating the die within the package with an encapsulating material.